

CLAIMS

What we claim is:

1. An expression vector, comprising:
a nucleic acid molecule encoding a non-proteolytic analog of a Hin47 protein of a strain of *Haemophilus* including a portion thereof encoding the leader sequence for said non- proteolytic analog, and

a promoter operatively connected to said nucleic acid molecule to direct expression of said non-proteolytic analog of a Hin47 protein having said leader sequence in a host cell.

2. The vector of claim 1 wherein said non-proteolytic analog of Hin47 protein is a mutation of natural Hin47 protein in which at least one amino acid selected from the group consisting of amino acids 91, 121 and 195 to 201 of natural Hin47 protein has been deleted or replaced by a different amino acid.

3. The vector of claim 2 wherein histidine 91 is replaced by alanine.

4. ~~The vector of claim 1 which is plasmid vector having the identifying characteristics of plasmid JB-3120-2 as seen in Figure 1A.~~

5. An expression vector for expression of a recombinant protein in a host cell, comprising:

a nucleic acid molecule encoding a non-proteolytic analog of a *Haemophilus* Hin47 protein,

at least one additional nucleic acid molecule encoding the recombinant protein, and

at least one regulatory element operatively connected to said first nucleic acid molecule and said at least one additional nucleic acid molecule to effect expression of at least said recombinant protein in the host cell.

6. The vector of claim 5 wherein said nucleic acid molecule encoding the non-proteolytic analog of a Hin47 protein includes a portion encoding the leader sequence for said non-proteolytic analog.

7. The vector of claim 6 wherein said non-proteolytic analog of Hin47 protein is a mutation of natural Hin47 protein in which at least one amino acid selected from the group consisting of amino acids 91, 121 and 195 to 201 of natural Hin47 protein has been deleted or replaced by a different amino acid.

8. The vector of claim 7 wherein histidine 91 is replaced by alanine.

~~9. The vector of claim 5 wherein said at least one additional nucleic acid molecule encodes a Hia or Hsf protein of a strain of *Haemophilus influenzae*.~~

10. The vector of claim 9 wherein said at least one additional nucleic acid molecule encodes a Hia protein which is N-terminally truncated.

11. The vector of claim 10 wherein said N-terminal truncation is S44 or V38.

~~12. The vector of claim 11 which is a plasmid vector having the identifying characteristics of plasmid DS-2342-2-2 as seen in Figure 5.~~

~~13. The vector of claim 11 which is a plasmid vector having the identifying characteristics of plasmid JB-3145-1 seen in Figure 10.~~

~~14. The vector of claim 5 wherein said at least one additional nucleic acid molecule encodes a PsaA protein of a strain of *Streptococcus pneumoniae*.~~

15. The vector of claim 14 which is a plasmid vector having the identifying characteristics of plasmid JB-3073R-1 as seen in Figure 12.

16. The vector of claim 14 which is a plasmid vector having the identifying characteristics of plasmid JB-3090-1 or JB-3090-7 as seen in Figure 13.

17. A method for expressing at least one protein, which comprises:
 providing a first nucleic acid molecule encoding a non-proteolytic analog of a Hin47 protein of *Haemophilus*;
 isolating at least one additional nucleic acid molecule encoding a protein other than Hin47;

 introducing the first nucleic acid molecule and the at least one additional nucleic acid molecule into a cell to produce a transformed cell; and

 growing the transformed cell to produce at least one protein.

18. The method of claim 17 wherein said first nucleic acid molecule contains a portion encoding the leader sequence for said non-proteolytic analog.

19. The method of claim 18 wherein said non-proteolytic analog of Hin47 protein is a mutation of natural Hin47 protein in which at least one amino acid selected from the group consisting of amino acids 91, 121 and 195 to 201 of natural Hin47 protein has been deleted or replaced by a different amino acid.

~~20. The method of claim 19 wherein histidine 91 is replaced by alanine.~~

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21. The method of claim 20 wherein said at least one additional nucleic acid molecule encodes a Hia or Hsf protein of a strain of *Haemophilus influenzae*.

22. The method of claim 21 wherein said at least one additional nucleic acid molecule encodes a Hia protein which is N-terminally truncated.

23. The method of claim 22 wherein said N-terminal truncation is S44 or V38.

~~Sub. 91~~ 24. ~~The method of claim 21 wherein said vector is a plasmid vector having the identifying characteristics of plasmid JB-3145-1 as shown in Figure 10.~~

25. The method of claim 20 wherein said at least one additional nucleic acid molecule encodes a PsaA protein of a strain of *Streptococcus pneumoniae*.

~~Sub. 92~~ 26. ~~The method of claim 17 wherein said first nucleic acid molecule encodes the nature form of the non-proteolytic analog.~~

27. The method of claim 26 wherein said non-proteolytic analog of Hin47 protein is a mutation of natural Hin47 protein in which at least one amino acid selected from the group consisting of amino acids 91, 121 and 195 to 201 of natural Hin47 protein has been deleted or replaced by a different amino acid.

28. The method of claim 27 wherein histidine 91 is replaced by alanine.

29. The method of claim 28 wherein said at least one additional nucleic acid molecule encodes a Hia or Hsf protein of a strain of *Haemophilus influenzae*.

30. The method of claim 29 wherein said at least one additional nucleic acid molecule encodes a Hia protein which is N-terminally truncated.

31. The method of claim 30 wherein said N-terminal truncation is S44 or V38.

~~Sub. 93~~ 32. ~~The method of claim 31 wherein said vector is a plasmid vector having the identifying characteristics of plasmid DS-2342-2-2 as seen in Figure 5.~~

33. The method of claim 31 wherein said vector is a plasmid vector having the identifying characteristics of plasmid JB-3134-1-1 as seen in Figure 9.

34. The method of claim 28 wherein said at least one additional nucleic acid molecule encodes a PsaA protein of a strain of *Streptococcus pneumoniae*.

~~Sub. 94~~ 35. ~~The method of claim 34 wherein said vector is a plasmid vector having the identifying characteristics of plasmid JB-3073R-1 as seen in Figure 12.~~

36. The method of claim 34 wherein said vector is a plasmid vector having the identifying characteristics of plasmid JB-3090-1 or JB-3090-7 as seen in Figure

37. An expression vector, comprising:

a nucleic acid molecule encoding a high molecular weight protein of a non-typeable strain of *Haemophilus* selected from the group consisting of *hmwB* and *hmwC*, and

a promoter operatively connected to said nucleic acid molecule to direct expression of said high molecular weight protein in a host cell.

38. The vector of claim 37 which is a plasmid vector having the identifying characteristics of plasmid IN-137-1-16 shown in Figure 18A.

39. The vector of claim 37 which is a plasmid vector having the identifying characteristics of pT7 *hmwC* shown in Figure 19A.

40. An expression vector for expression of a recombinant protein in a host cell, comprising:

a nucleic acid molecule encoding a high molecular weight (HMW) protein of a non-typeable strain of *Haemophilus* selected from the group consisting of *hmwBC*, *hmwB* and *hmwC*,

at least one additional nucleic acid molecule encoding the recombinant protein, and

at least one regulatory element operatively connected to said first nucleic acid molecule and said at least one additional nucleic acid molecule to effect expression of at least said recombinant protein in the host cell.

41. The expression vector of claim 40 wherein said at least one additional nucleic acid molecule is inserted into a plasmid having the identifying characteristics of plasmid IN-52-1-13 as shown in Figure 17A and under control of said at least one regulatory element.

42. The expression vector of claim 40 wherein said at least one additional nucleic acid molecule is inserted into a plasmid having the identifying characteristics of plasmid IN-137-1-16 shown in Figure 18A and under control of said at least one regulatory element.

43. The expression vector of claim 40 wherein said at least one additional nucleic acid molecule is inserted into a plasmid having the identifying characteristics of plasmid pT7 *hmwC* shown in Figure 19A and under control of said at least one regulatory element.